

Malnutrition syndrome as a prognostic risk factor for intestinal suture failure in elderly and senile patients with gastric and duodenal ulcer perforation

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Abstract

Objective. To study the effect of malnutrition syndrome on the risk of intestinal suture failure in elderly and senile patients with gastric and duodenal ulcer perforation.

Materials and methods. The results of treatment of 100 elderly and senile patients with perforated gastric and duodenal ulcers who were operated on urgently were analysed. According to the results of previous studies and the analysis of literature sources, the Edmonton Frail scale was used as the basis for the diagnosis of senile asthenia syndrome.

Results. On the basis of the assessment of the presence of senile asthenia syndrome, patients of the total sample were divided into two groups: A – 42 (42.0%) patients without senile asthenia syndrome; B – 58 (58.0%) patients with detected senile asthenia syndrome. Determination of total protein and albumin levels confirmed the presence of malnutrition syndrome in patients with senile asthenia syndrome: group A – 70.93 (66.00; 76.00) and 34.61 (31.50; 38.20) g/l, respectively; group B – 61.35 (55.00; 70.00) g/l ($p = 0.0009$, $U = 224.0$) and 29.75 (24.70; 35.70) g/l ($p = 0.0072$, $U = 268.0$). The analysis of the incidence of postoperative complications revealed that, although the diagnoses, prevalence of inflammation and volume of surgical intervention in the groups were comparable, the incidence of intestinal suture failure in group B was higher – 11 (19.0%) patients than in group A – 2 (4.8%) patients ($p = 0.0386$, $U = 1045.0$). The obtained results confirm that the presence of malnutrition syndrome can be considered a prognostic factor for the development of such a complication as intestinal suture failure.

Conclusions. The statistically significant effect of malnutrition syndrome on the incidence of intestinal sutures failure was determined: 4.8% – in patients without senile asthenia; 19.0% – in patients with senile asthenia ($p = 0.0386$, $U = 1045.0$). Determination of the syndrome of senile asthenia before surgery in elderly and senile patients will make it possible to choose the optimal volume of surgical intervention and timely start corrective therapy in the early postoperative period to reduce the incidence of surgical postoperative complications and improve the quality of treatment of this category of patients.

Key words: malnutrition; perforation; senile asthenia syndrome; peritonitis.

Perforation of gastric and duodenal ulcer (duodenal ulcer) is one of the most severe complications of peptic ulcer disease, accompanied by peritonitis and requiring urgent surgical intervention [1]. Surgical treatment of this complication is always associated with a high risk of intestinal sutures failure, as the operation is performed in the setting of a severe inflammatory process, ulcerative infiltration of the stomach wall or duodenum. Therefore, the treatment of such patients should take into account all aspects to ensure effective results and prevent the development of surgical complications and death [2, 3].

Elderly and geriatric patients are classified as a separate category because, in addition to the underlying surgical disease, they have comorbidities, including senile asthenia syndrome (SAS) [4], which significantly affects the course of the perioperative period and treatment outcomes. Today, scientists are paying more and more attention to SSA and its impact on the patient's general condition and the risk of complications. The main pathogenetic mechanism of OSA is considered to be malnutrition syndrome, which is

a consequence of age-related atrophic changes in the oral cavity (tooth loss and involution of taste buds) [5]. These changes lead to eating disorders, and the increased sensitivity of the satiety centre receptors in the medulla oblongata increases the feeling of satiety from a much smaller amount of food. These age-related factors cause a decrease in total blood protein levels, hypoalbuminemia, dysproteinemia, and dyslipidaemia. Lack of proteins and dyslipidaemia trigger a chain reaction that disrupts the muscular system, causes hypoperfusion and hypoxia of tissues, thereby stimulating anaerobic glycolysis and the development of acidosis and sarcopenia [6–8]. All this has a negative impact on the body as a whole. A severe inflammatory process against the background of gastric or duodenal ulcer perforation, ulcer infiltrate, impaired intestinal wall perfusion, hypo- and dysproteinemia increase the risk of intestinal suture failure. Therefore, the diagnosis of SSA at the preoperative stage will allow clinicians to adjust therapy in the perioperative period to prevent the development of this complication.

The aim of the study was to investigate the effect of

malnutrition syndrome on the risk of intestinal suture failure in elderly and geriatric patients with gastric ulcer and duodenal perforation.

Materials and Methods

To evaluate the impact of malnutrition syndrome on the risk of intestinal suture failure, we analysed the results of treatment of 100 patients with gastric ulcer and duodenal ulcer aged 60 to 89 years who were admitted to the Zaporizhzhia City Emergency Hospital as an emergency. This study is part of the dissertation work on the topic: "Surgical aspects of treatment of elderly and senile patients in emergency abdominal surgery". Patients were not included in the study based on the following criteria: age under 60 or over 90 years, refusal of surgery, gastric perforation and duodenal ulcer in the setting of a malignant tumour process.

All patients admitted to the clinic were confirmed by the results of esophagofibrogastroduodenoscopy using an Olym-

pus GIF-H170 (Japan) and an abdominal X-ray using the REX-650RF X-ray diagnostic system (Korea). In addition, all patients underwent a complete blood count using a Mythic 18 haematology analyzer (Orphee SA, Switzerland) and, as part of this study, the levels of total protein and albumin were additionally determined using a FLEXOR E biochemical analyzer (VITALAB, the Netherlands, 2009). The reference values for total protein were 65 – 85 g/l and albumin (adults over 60 years of age) were 34 – 48 g/l.

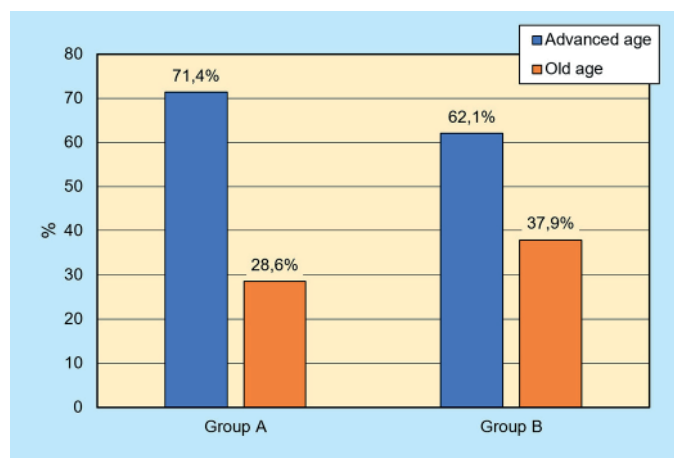
All patients were operated on urgently, the total duration of preoperative preparation was (1.8 ± 0.4) hours, which corresponded to the standards and treatment protocols of the clinic. The average age of the patients was (71.4 ± 8.1) years. The gender distribution of the study patients was almost equal: 53 (53.0%) women and 47 (47.0%) men.

According to the results of previous studies and the analysis of literature sources, the Edmonton Frail scale was used as the basis for the diagnosis of OSA. The choice of this scale in emergency abdominal surgery is due to its wide range in assessing asthenia factors and the speed of their determination, which is very important in acute peritonitis [9, 10].

The statistical evaluation of the study results was carried out using STATISTICA 13.0, TIBCO Software Inc (licence JPZ804I382130ARCN10-J) and MICROSOFT EXCEL 2013 (licence 00331-10000-00001-AA404) using parametric and non-parametric criteria.

Results

According to the results of the assessment of the presence of SSA, patients were divided into two groups: A – 42 (42.0%) patients without SSA and B – 58 (58.0%) patients with detected SSA. The analysis of age categories (see Figure) showed no statistically significant difference between the groups (p = 0.1214, U = 603.0).



Distribution of patients in groups by age category.

Table 1. The nature of the exudate and the extent of peritonitis

Indicator.	Patient group				p
	A (n = 42)		B (n = 58)		
	abs.	%	abs.	%	
The nature of the exudate					
serous	6	14,3	8	13,8	0,8675
serous-fibrinous	26	61,9	29	50,0	0,5783
fibrinous-purulent	7	16,7	17	29,3	0,0745
purulent	3	7,1	4	6,9	0,8856
Prevalence of peritonitis					
local	5	11,9	7	12,1	0,9276
diffuse	24	57,1	32	55,2	0,7983
spilled	13	31,0	19	32,8	0,2085

All patients were operated on immediately, no acute ulcers were detected during surgery. Perforation of gastric ulcer in group A was diagnosed in 9 (21.4%) patients, perforation of duodenal ulcer – in 33 (78.6%) patients, in group B – in 12 (20.7%) and 46 (79.3%) patients, respectively. The frequency of perforation of gastric ulcer and duodenal ulcer was comparable ($p = 0.6234$, $U = 697.0$).

The vast majority of patients in both groups (93.0%) were hospitalised with the reactive phase of peritonitis, so no difference between the groups was determined by this indicator. However, the groups were assessed separately by the degree and prevalence of the process (Table 1).

According to Table 1, the study groups are completely comparable in terms of the degree of inflammation, determined by the nature of the exudate, and the prevalence of peritonitis, which allowed us to exclude the influence of these factors on the incidence of intestinal suture failure.

All patients underwent surgery using total intravenous anaesthesia with artificial lung ventilation. Among the surgical interventions performed in both groups, ulcer excision with pyloroduodenoplasty prevailed. The distribution of patients in the groups by the type of surgical intervention performed was completely comparable (Table 2).

Based on the results of biochemical blood tests, a statistically significant decrease in the levels of total protein and blood albumin in patients with SSA was determined,

namely group A – 70.93 (66.00; 76.00) and 34.61 (31.50; 38.20) g/l, respectively, group B – 61.35 (55.00; 70.00) g/l ($p = 0.0009$, $U = 224.0$) and 29.75 (24.70; 35.70) g/l ($p = 0.0072$, $U = 268.0$), respectively.

Postoperative therapy was carried out in accordance with hospital standards [11].

The analysis of the frequency of postoperative surgical complications (Table 3) showed no overall statistically significant difference between the groups in this indicator ($p = 0.3548$, $U = 1085.0$), but the frequency of intestinal suture failure was statistically significant: group B – 19.0%, group A – 4.8% ($p = 0.0386$, $U = 1045.0$).

Such complication as suture failure required repeated surgical intervention in all patients of both groups, which significantly affected the overall mortality rate in the groups: 5 (11.9%) patients died in group A, 24 (41.4%) patients died in group B ($p = 0.0123$, $U = 859.0$).

Discussion

The examination and analysis of the treatment results revealed that more than half of elderly and senile patients (52.0%) were hospitalised with SSA, which corresponds to the literature data on the frequency of this syndrome [9]. Determination of the levels of total protein and albumin in the blood confirmed the fact that patients with SSA have malnutrition syndrome. The studied groups of patients differed statistically significantly in terms of total protein

Table 2. Surgical interventions performed

Type of surgical intervention	Group of patients				p
	A (n = 42)		B (n = 58)		
	abs.	%	abs.	%	
Suturing an ulcer	3	7,1	1	1,7	0,0928
Excision of the ulcer with pyloroduodenoplasty	34	81,0	48	82,8	0,7583
Gastric resection according to Bilrot-II in the Balfour modification	5	11,9	9	15,5	0,2347

Table 3. Types of surgical complications

Complications	Group of patients			
	A (n = 42)		B (n = 58)	
	abs.	%	abs.	%
Postoperative wound suppuration	2	4,8	4	6,9
Failure of plastics or anastomosis sutures	2	4,8	11	19,0
Anastomosis	-	-	1	2,0
Event.	3	7,1	-	-
In total ...	7	16,7	16	27,6

and blood albumin: $p = 0.0009$, $U = 224.0$ and $p = 0.0072$, $U = 268.0$, respectively. However, these examinations require time and extensive blood tests to diagnose hypoproteinaemia and dysproteinemia, which is not always possible in the setting of emergency surgery, while the determination of the presence of CAD using the Edmonton Frail scale takes only 10–15 minutes [12]. In addition, the use of this scale does not require special skills and additional tools. If it cannot be used with the patient alone due to the severity of their general condition, caregivers can be involved.

The analysis of the frequency of postoperative complications showed that in the presence of comparable diagnoses, indicators of the prevalence of the inflammatory process and the volume of surgical intervention, the incidence of intestinal suture failure in the group of patients with SSA (19.0%) was statistically significantly ($p = 0.0386$, $U = 1045.0$) higher than in the group of patients without SSA (4.8%). These results confirm that malnutrition syndrome can be considered a prognostic factor for the development of intestinal suture failure. Therefore, it is important to assess the patient's condition by a clinician before surgery and confirm the presence of SSA in order to assess the risks and not to exceed the scope of surgery and to initiate appropriate therapy with albumin preparations and parenteral nutrition in the early postoperative period to prevent this complication [13, 14].

Conclusions

1. A statistically significant ($p = 0.0386$, $U = 1045.0$) effect of malnutrition syndrome on the incidence of intestinal suture failure was determined, which in patients without SSA was 4.8%, while in patients with SSA it was 19.0%.

2. Diagnosis of OSA at the preoperative stage in elderly and geriatric patients requiring emergency abdominal surgery will help to choose the optimal volume of surgical intervention and timely start corrective therapy in the early postoperative period to reduce the incidence of surgical complications and improve the quality of treatment of this category of patients.

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Authors' contribution. Danyliuk M. B. – collection and analysis of research results; Zavgorodniy S. M. – concept and design of the study; Kubrak M. A. – statistical processing of data; Chemeris Y. O. – analysis of research results.

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Prospects for further research. The work extends the search for optimal scales for diagnosis and staging of postoperative complications, which will allow developing optimal algo-

gorithms for diagnosis and treatment of elderly and geriatric patients in emergency abdominal surgery.

References

1. Maksymchuk DV, Mamchyn VI, Maksymchuk VD. Choice of method of surgical treatment of perforated pyloroduodenal ulcer. Kharkiv surgical school. 2021;(1–2):8–13. Ukrainian. doi: 10.26779/2522–1396.2021.1–2.08.
2. Smetkov DO, Goncharov NM, Teslenko SM, Svirepo PV, Syvogelizov AV, Sykal MO, et al. Modern views on the treatment of perforated pyloroduodenal ulcers. Kharkiv surgical school. 2012;(2):33–6. Ukrainian doi: 10.37699/2308–7005.2.2021.06.
3. Weledji EP. An Overview of Gastroduodenal Perforation. Front Surg. 2020 Nov 9;7:573901. doi: 10.3389/fsurg.2020.573901. PMID: 33240923; PMCID: PMC7680839.
4. Boyko V, Parkhomenko K, Nikonov V, Feskov O, Gavrikov O. Comorbid pathology in herniology. Emergency Medicine. 2021;17(1):14–20. Ukrainian. doi: 10.22141/2224–0586.17.1.2021.225709.
5. Skybchik V, Bablyak S. Frailty – current problem of geriatric medicine. Hypertension. 2021;(4):12–8. Ukrainian. doi: 10.22141/2224–1485.4.60.2018.141770.
6. Koval NP, Aravicka MG. Efficiency of correction by measures of physical therapy indicators of fall risk and physical status in elderly persons with senile asthenia and metabolic syndrome. Ukrainian Journal of Medicine, Biology and Sports. 2020;5(6):282–91. Ukrainian. doi: 10.26693/jmbs05.06.282.
7. Rockwood K, Mitnitski A. Frailty defined by deficit accumulation and geriatric medicine defined by frailty. Clin Geriatr Med. 2011 Feb;27(1):17–26. doi: 10.1016/j.cger.2010.08.008. PMID: 21093719.
8. Yao X, Li H, Leng SX. Inflammation and immune system alterations in frailty. Clin Geriatr Med. 2011 Feb;27(1):79–87. doi: 10.1016/j.cger.2010.08.002. PMID: 21093724; PMCID: PMC3011971.
9. Kim S, Kim M, Jung HW, Won CW. Development of a Frailty Phenotype Questionnaire for Use in Screening Community-Dwelling Older Adults. J Am Med Dir Assoc. 2020 May;21(5):660–4. doi: 10.1016/j.jamda.2019.08.028. Epub 2019 Oct 28. PMID: 31672563.
10. Skibchik VA, Bablyak SD. The syndrome of senile asthenia (frailty) is a modern problem of gerontological medicine. Hypertension. 2018;(4):33–7 Ukrainian. doi: 10.22141/2224–1485.4.60.2018.141770.
11. Standarty ta klinichni protokoly nadannia medychnoi dopomohy zi spetsialnosti "Khirurgiia Standards and clinical protocols for the provision of medical care in the specialty "surgery". Order No 297. 02.04.2010. [Internet]. Available from: <https://www.dovidnyk.org/dir/24/130/>. Ukrainian.
12. Danyliuk MB, Zavgorodniy SM, Rylov AI, Kubrak MA, Percov IV. Senile asthenia as a predictor of the severity of the course of the postoperative period in elderly and senile patients. Pathologia. 2022;(3):189–94. Ukrainian. doi: 10.14739/2310–1237.2022.3.260273.
13. Danyliuk MB, Zavgorodniy SM, Fedotov ER, Mykhalchenko EK, Dobrodub IV. Study of senile asthenia markers against the background of an acute inflammatory process in elderly patients and old age in emergency abdominal surgery. Modern medical technologies. 2024;16(2):93–8. Ukrainian]. doi: 10.14739/mmt.2024.2.300179.
14. Bunchormtavakul C, Reddy KR. Review article: malnutrition/sarcopeenia and frailty in patients with cirrhosis. Aliment Pharmacol Ther. 2020 Jan;51(1):64–77. doi: 10.1111/apt.15571. Epub 2019 Nov 8. PMID: 31701570.

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